CORRES CONTROL
OUTGOING LTR NO

DOE ORDER #

04 RF 00751

DIST	LTR	ENC
Berardini, Jacqueline	X	
BRAILSFORD, M.D		
FERRERA, D W	X	
FERRI, M S		
FULTON, J C		
GIACOMINI, J		
HALL, L		
MARTINEZ, L A		
PARKER, A M		
POWERS, K		
SCOTT, G K		
SHELTON, D C	X	
SPEARS, M S		
TRICE, K D		
VOORHEIS, G M		
BUTLER, J L	X	X
THORNBURG, AMY	X	
COR. CONTROL	X	X
ADMN. RECORD	X	X
WASTE REC. CTR		
TRAFFIC		
PATS/130		
CLASSIFICATION:		
UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
Exemption – CEX-105-01

Date

IN REPLY TO RFP CC NO

ACTION ITEM STATUS

☐ PARTIAL/OPEN

☐ CLOSED

LTR APPROVALS

ORIG & TYPIST INITIALS

Revision 6/03

KAISER•HILL COMPANY

July 14, 2004

04-RF-00751

Mr. Joseph A. Legare, Director
Project Management Division
DOE, RFPO

Mr Steve Gunderson
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1502

Mr Mark Aguilar
U S Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

TRANSMITTAL OF FINAL JUSTIFICATION FOR NFAA OF PAC 000-190, CAUSTIC LEAK – JLB-063-04

Enclosed are copies of the Final Justification for NFAA of PAC 000-190, Caustic Leak for your files. Previous comments have been incorporated and the document was approved by CDPHE on July 9, 2004

If you have any questions, please contact me at extension 5245.

J Lane Butler for
Manager, Environmental Restoration Programs

JLB dm

Orig and 1 cc – Joseph Legare
cc· Norma Castaneda

Enclosures
As Stated

RECEIVED
JUL 2 0 2004

ADMIN RECORD

IA-A-001221

NO FURTHER ACCELERATED ACTION JUSTIFICATION FOR CAUSTIC LEAK

PAC REFERENCE NUMBER: 000-190

IHSS Number	190
Operable Unit	IA
IHSS Group	000-3
Unit Name	Caustic Leak
Approximate Location	N749,000, E2,082,000 - Steam plant (Building 443) catch basin to Pond B-1 via Central Avenue ditch and South Walnut Creek

Date(s) of Operation or Occurrence

December 3 and 4, 1978 and January 6, 1989

Description of Operation or Occurrence

On December 3 and 4, 1978 a bulk caustic storage tank leaked into its spill catch basin Due to operator error, a sodium hydroxide (NaOH) solution was subsequently released from the catch basin to the Central Avenue Ditch The sodium hydroxide solution flowed eastward down the Central Avenue Ditch and was diverted to South Walnut Creek and Pond B-1 for temporary containment (DOE 1992) Figure 1 shows the location of IHSS 000-190

On January 6, 1989, caustic solution was released from the same Building 443 tank involved in the December 1978 incident, into its secondary containment (spill catch basin) The outlet pipe and valve on the tank deteriorated to the extent that the pipe disconnected from the tank Due to cold weather, the caustic froze which prevented further leakage (DOE 1992)

Physical/Chemical Description of Constituents Released

The December 1978, incident involved about 1,000 to 1,500 gallons of caustic solution that was composed of 12 5 Normal NaOH (sodium hydroxide) also expressed as 50 percent NaOH This is generically referred to as concentrated sodium hydroxide The January 1989 incident involved about one to three gallons of concentrated caustic solution (DOE 1992)

Responses to Operation or Occurrence

In response to the December 1978 incident, immediate steps were taken to isolate the contamination, treat the contaminated runoff, and divert drainage from adjacent areas These steps included the following (DOE 1992)

- Divert the 400 area snow melt water across Central Avenue Ditch to the 700 area drainage,
- Dam the upper Central Avenue Ditch above the B-Series ponds near the cattle fence,
- Divert Building 995 sewage effluent to Pond 207B-South and retain Pond B-3 as a reserve pond,
- Rope off the upper portion of the Central Avenue Ditch,
- Pump Pond B-2 to Pond A-2 and hold Pond B-2 as a last resort catch pond, and,
- Neutralize Pond B-1 by adding 1,400 pounds of alum and then pump this liquid to Pond 207B-North

Follow-up response activities to the December 1978 incident included (DOE 1992)

- Neutralize the Central Avenue Ditch water between Fifth and Tenth Streets by adding 5.000 pounds of alum,
- Complete final sampling of Pond 207B-North on about January 19, 1978,
- Monitor the pH of the ditch On March 23, 1979, the ditch was considered to be no longer a problem and runoff from ditch was allowed to be discharged offsite,
- On about May 4, 1979, Pond 207B-North liquid was drained into Pond B-2, and,
- On about June 29, 1979, the remaining liquid in Pond B-1 was declared environmentally acceptable and sprayed on the adjacent hillside

The tank leak was identified and all repairs were completed Furthermore, the incident was reviewed with all Stationary Operating Engineers at the Central Steam Plant and they were directed to review all standard operating procedures on chemical handling and storage An incident report was prepared (DOE 1992)

In response to the January 1989 incident, the tank was temporarily repiped and emptied The removed caustic was neutralized and transferred to Building 374 for treatment as a process waste (DOE 1992)

Fate of Constituents Released to Environment

IHSS 000-190 has not been specifically investigated Although the IHSS has been sampled in many locations as part of investigations of other neighboring IHSSs, these data (radionuclides, metals, organics) are generally not relevant to the contaminant release, i e , a spill of sodium hydroxide First, sodium (a metal) is considered a common essential nutrient, and accordingly, does not have a Wildlife Refuge Worker (WRW) Action Level (AL) (DOE, CDPHE, EPA 2003) The potential hazard to the release of sodium hydroxide is elevation of the pH of the water in the ditch, and in Pond B-1 where the water had discharged The pH rises in the water because of the release of hydroxyl ions from the dissolution of the sodium hydroxide as follows

$NaOH \rightarrow Na^{+} + OH^{-}$

However, as reported, the water was neutralized soon after the release by the addition of alum ($Al_2(SO_4)_3$) in accordance with the following reaction

$Al_2(SO_4)_3 + 6\ OH^- \rightarrow 2\ Al(OH)_3 + 3\ SO_4^{2-}$

The aluminum hydroxide ($Al(OH)_3$) that is produced is a solid that would have settled out of the water However, even if residual aluminum hydroxide is present in the ditch today, the maximum aluminum concentration in surface soil within and directly adjacent to the IHSS is 23,000 mg/kg occurring at sampling location BZ39-000 (see Figure 2 for surface soil sample locations) This concentration is an order of magnitude below the WRW AL for aluminum of 228,000 mg/kg

Lastly, the release occurred over 15 years ago, a time frame over which a significant quantity of water has flowed through the ditch further neutralizing/diluting the original sodium hydroxide release

NFAA Summary

IHSS 000-190 is proposed for NFAA The release that rendered the ditch an IHSS was a caustic spill which raised the pH of the water The documentation shows the water was adequately neutralized with alum shortly after the spill event The neutralization process produces aluminum hydroxide which would have settled out of the water However, aluminum concentrations in surface soil within the IHSS are well below the WRW AL Lastly, the release occurred over 15 years ago, a time frame over which a significant quantity of water has flowed through the ditch further neutralizing/diluting the original sodium hydroxide release Therefore, it is concluded that no further accelerated action is required at IHSS 000-190

References

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, CO, August

DOE, CDPHE, EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment 5, U S Department of Energy, Colorado Department of Public Health and Environment, and U S Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June

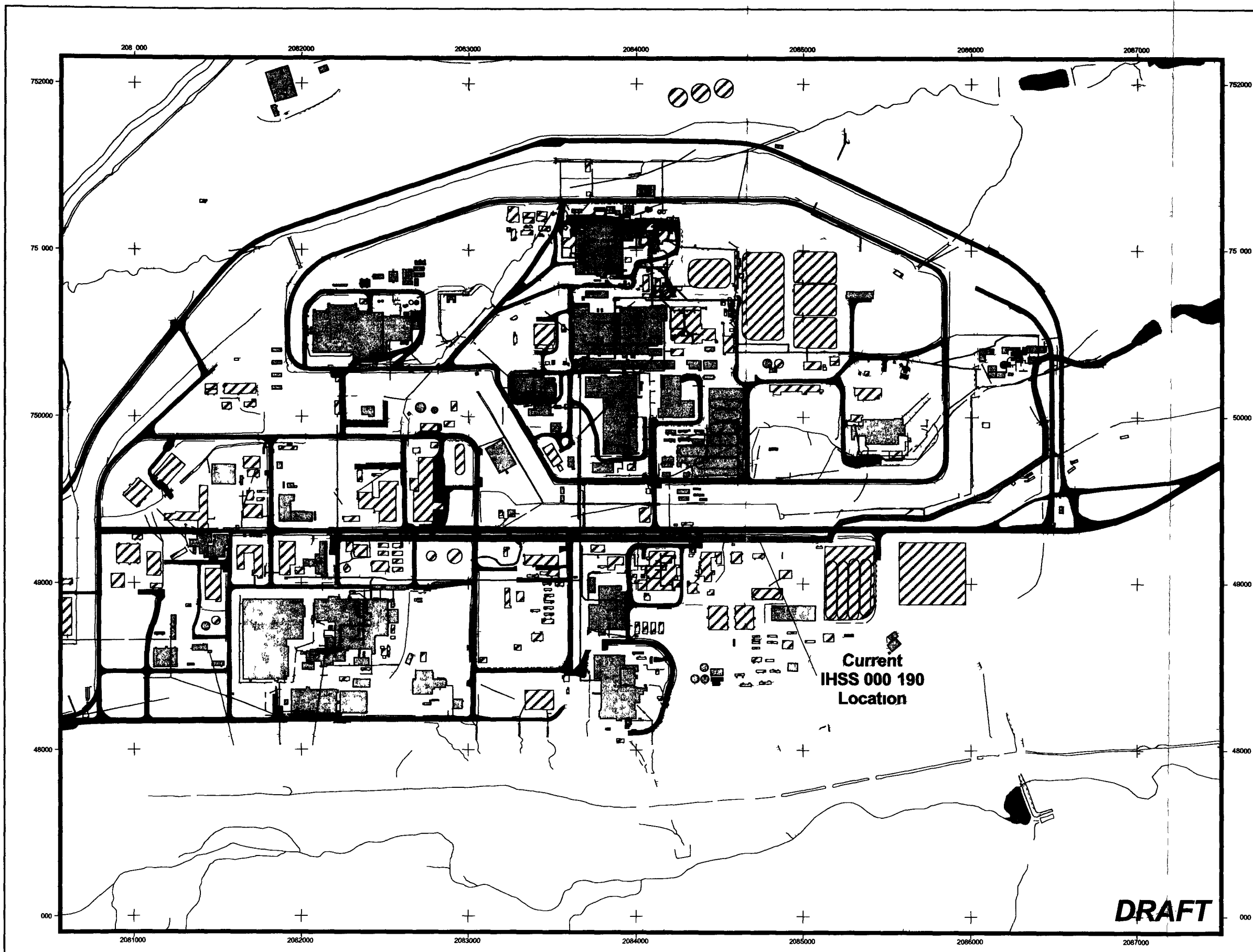

Figure 1
IHSS 000 190
Location Map

KEY

- IHSS
- Fence
- Storm Drain
- OPWL
- Dirt Road
- Stream
- Lake
- Structure
  - Demolished
  - Standing
- Paved Road

Disclaimer
Neither the United States Government nor Kaiser L C nor CH2MH nor an agency thereof nor any of their employees makes a warranty expres or implied or assumes any lega liability or responsibility for accuracy completeness or usefulness of any information apparatus product or process disclosed or represents that its use would not infringe privately owned rights

N
W E

500 0 500 Feet

Scale 1 7 000

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by [redacted] Date April 2004

Prepared for

KAISER•HILL COMPANY

File w:\projects\fy2004\central ave ditch\central ave ditch apr igure

5

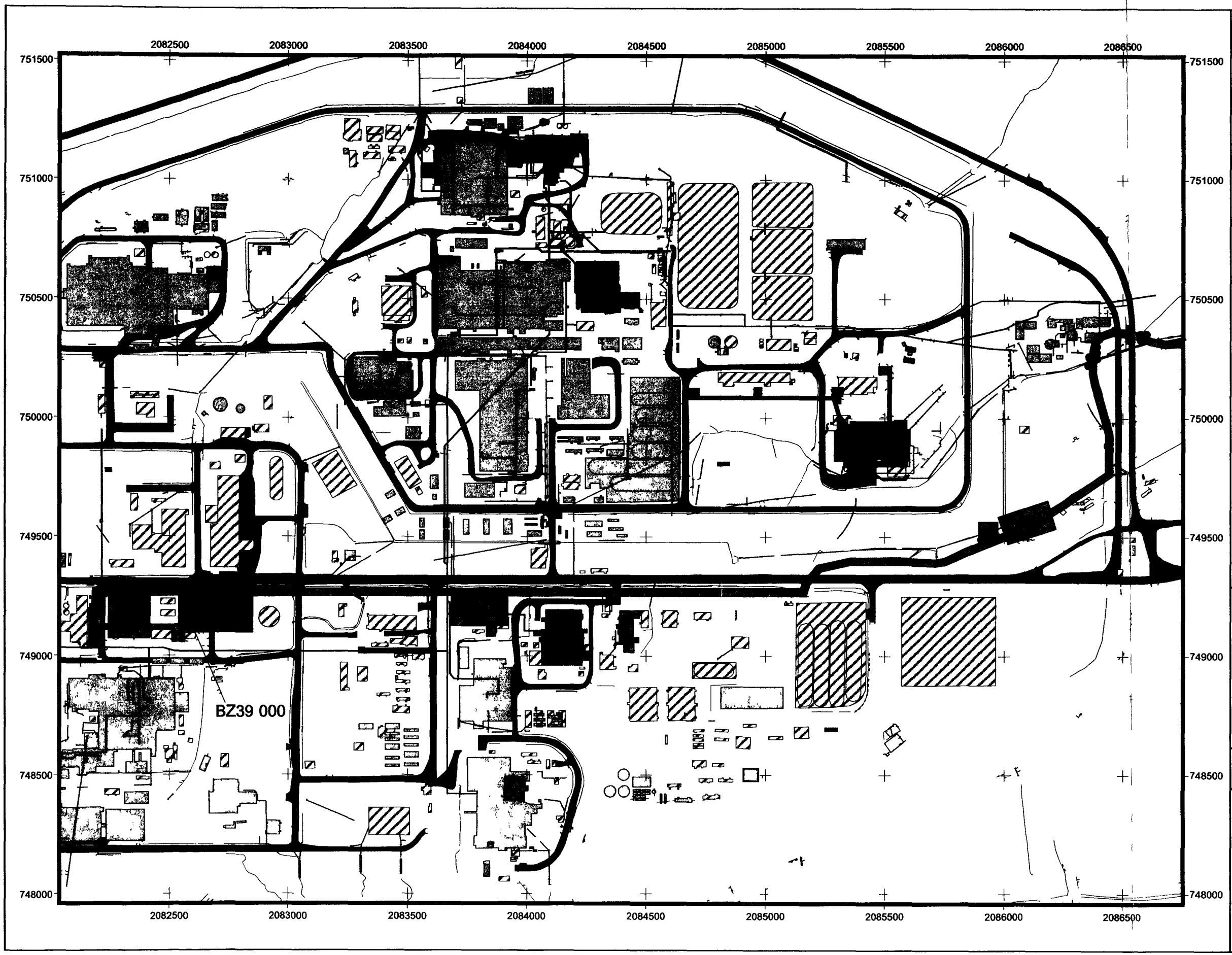

Figure 2
Aluminum Surface Soil Sampling Locations

- Sampling locations
- Storm drains
- OPWL
- Dirt roads
- Streams
- IHSS
- UBC
- PAC
- Demolished building
- Standing building
- Lakes
- Paved roads

DRAFT

W E S

350 0 350 Feet

Scale 1 4750

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Date 7 6 04

Prepared by [redacted]

Prepared for KAISER HILL COMPANY

F le W \Projects\Fy2004\central_ ditch\
central_a _ditch_041504 pr

6/6